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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/227,935	01/11/1999	EIJI HASUNUMA	49657-274	7512

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EXAMINER

LOKE, STEVEN HO YIN

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 08/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/227,935

Applicant(s)

HASUNUMA ET AL.

Examiner

Steven Loke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4 and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

1. Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Fig. 1 discloses the width of the middle portion of the first impurity region portion [52] is larger than the internal diameter of the connection hole [10a]. The specification never discloses the width of the first impurity region portion is approximately equal to the internal diameter of the connection hole as claimed in claim 8.

2. Claims 1, 2, 4 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, lines 18-19, the phrase "the cross-sectional width of the first impurity region portion" is unclear as to which cross-sectional width is it being referred to. The cross-sectional width of the first impurity region portion is varied along the depth of the first impurity region portion.

In claim 1, lines 19-20, the phrase "the cross-sectional width of the second impurity region portion" is unclear as to which cross-sectional width is it being referred to. The cross-sectional width of the second impurity region portion is varied along the depth of the second impurity region portion.

In claim 8, line 2, the phrase "the first impurity region" has no antecedent basis; line 2, the phrase "the width of the first impurity region portion" is unclear as to which width

is it being referred to. The cross-sectional width of the first impurity region portion is varied along the depth of the first impurity region portion.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2 and 4 insofar, as in compliance with 35 USC 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Prior art (fig. 15) in view of Kuroda (U.S. Patent no. 5,825,059).

In regards to claim 1, Prior art (fig. 15) discloses a semiconductor device. It comprising: a semiconductor substrate [1] having a main surface; an element isolating region (a region occupied by oxide [2]) for defining an element forming region (a region occupied by nMOS [100]) on the main surface of the semiconductor substrate; an isolation region [3] having a strip-shape in cross section and inherently having a peak impurity concentration at a prescribed depth position from the main surface of said semiconductor substrate; a connection hole [10a] provided piercing through the element isolating region [2]; an interconnection layer [13] provided to fill an inner portion of said connection hole; and an impurity region [12] provided in said semiconductor substrate extending from the lower end of said connection hole [10a] to said isolation region [3], wherein said impurity region [12] comprises a first impurity region portion (a lower portion of the impurity region [12]) provided to connect said interconnection layer [13] to said isolation region [3], and a second impurity region portion (an upper portion of the

impurity region [12]) provided near the lower end of said connection hole [10a] and connected to said interconnection layer [13], the cross-sectional width of the first impurity region portion (the cross-sectional width of the first impurity region portion near the isolation region [3]) being smaller than the cross-sectional width of the second impurity region portion (the cross-sectional width of the second impurity region portion near the middle portion of impurity region [12]).

Prior art (fig. 15) differs from the claimed invention by not showing an anti-HF (hydrofluoric acid) side wall film not etched by hydrofluoric acid, provided to cover a side wall of said connection hole at least near a lower end of said connection hole.

Kuroda shows an anti-HF (hydrofluoric acid) side wall film [20] not etched by hydrofluoric acid (col. 6, lines 9-11), provided to cover a side wall of a connection hole [19] at least near a lower end of said connection hole.

Since both Prior art (fig. 15) and Kuroda teach a contact hole formed on an impurity region, it would have been obvious to have the anti-HF side wall film of Kuroda in Prior art (fig. 15) because it protects the interconnection layer.

In regards to claim 2, Kuroda further teaches the anti-HF side wall film is a nitride film (col. 5, lines 20-23).

In regards to claim 4, Kuroda further teaches the anti-HF side wall film is either a polysilicon film or an amorphous silicon film (col. 5, lines 20-23).

5. Applicant's arguments filed 5/20/03 have been fully considered but they are not persuasive.

It is urged, in pages 4 and 5 of the remarks, that the prior art impurity region has a cross sectional width of little variation and a person of ordinary skill in the art would not have recognized the prior art figure as depicting a lower impurity region portion having a smaller cross-sectional width than the width of a higher impurity region portion.

However, as mentioned in the rejection, the cross-sectional width of the first impurity region portion (the cross-sectional width of the first impurity region portion near the isolation region [3]) being smaller than the cross-sectional width of the second impurity region portion (the cross-sectional width of the second impurity region portion near the middle portion of impurity region [12]). Therefore, Prior art (fig. 15) does show a lower impurity region portion having a smaller cross-sectional width than the width of a higher impurity region portion as claimed in claim 1.

It is urged, in page 5 of the remarks, that the prior arts never disclose the claimed impurity region portions have configurations, identifiably distinct from each other, and are formed by different steps in the manufacturing process. However, as shown in the rejection, the combined references do show the two distinct impurity region portions as claimed in claim 1. Since the process of how the impurity region portions are formed has no patentable weight in claim drawn to structure, it is not necessary for the prior art to show the manufacturing process.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (703) 308-4920. The examiner can normally be reached on 7:50 am to 5:20 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

sl
August 23, 2003

Steven Locke
Primary Examiner

A handwritten signature in cursive script that reads "Steven Locke".